REMARKS

Claims 1 and 2 have been amended based on the disclosure of 7 at% on page 9 in the application. Claims 5-8 have been added based on the disclosure in the last sentence of the only full paragraph on page 9. Claims 9 and 10 have been added based on the last full sentence on page 9, wherein Fe is present to adjust equilibrium dissociation pressure.

Entry of the above amendment is respectfully requested.

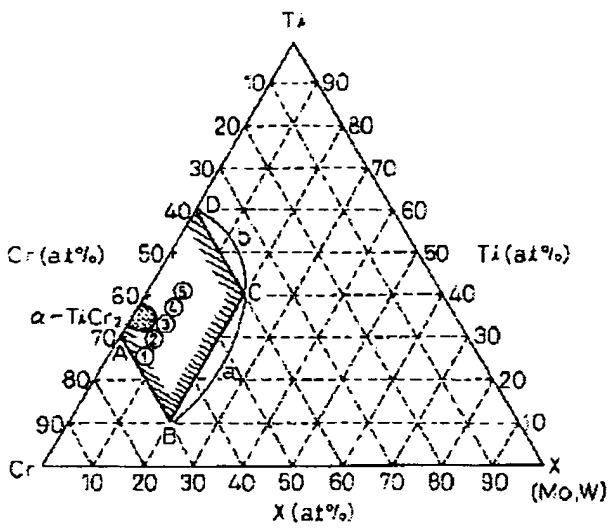
Anticipation Rejection

On page 2 of the Office Action, in paragraph 2, claims 1-4 are rejected under 35 U.S.C. 102(b) as being anticipated by Japanese Patent JP 10-121180 A (JP '180).

The Examiner's Position

The Examiner's position is basically that JP '180 teaches a hydrogen storage alloy having a Ti-Cr-Mo formula, wherein the structure of the alloy is body-centered cubic, as recited in claims 1 and 2. The Examiner indicates that JP '180 further teaches a method wherein the hydrogen storage alloy is heat treated at conditions encompassed by the conditions instantly claimed, including a water quench (i.e., cooling at a rate not less than the speed of water cooling), as recited in claims 3-4. JP '180 teaches ranges of Ti, Cr and Mo that overlap the ranges recited in the instant claims and further teaches specific embodiments that are fully encompassed by claims 1 and 2, as shown in Figure 1:

(a)



(b)

(at%)

	Ti	Cr	X
①	27	66	7
②	30	63	7
③	33	60	7
④	36	57	7
⑤	39	54	7

The Examiner notes that claim 2 is anticipated by JP '180 despite the recitation of Fe, because the claimed compositional concentration of Fe (i.e., "d") is "not larger than 15% by atomic weight", which encompasses zero.

Applicants' Response

Applicants respectfully submit that the invention as recited in the amended claims is not anticipated by (or obvious over) JP '180, and request that the Examiner reconsider and withdraw this rejection in view of the following remarks.

Initially, Applicants note that the claims have been amended to recite a lower limit of greater than 7 at% for Mo. Thus, the 7 at% value for X in all the Examples in JP '180 is not within the scope of the presently amended claims.

Further, another reason why JP '180 does not teach a specific compound within the present invention is because X is not necessarily even Mo (it could be W).

With respect to newly added claims 9 and 10, it is noted the Fe must be present in the composition, and thus the Examiner's statement at the top of page 4 of the Office Action clearly does not apply to these claims, such that these claims are not anticipated for this additional reason.

Thus, Applicants submit that the present invention is not anticipated by JP '180.

Moreover, Applicants submit that the present invention is not even obvious over JP '180, as discussed below.

Figs. 2 and 3 in the application show a comparison between two heat treatments on a PCT diagram, under the same material constitution (except that Fig. 2 = Mo: 10 at %, while Fig. 3 = Mo: 7 at %) and the same service temperature comparison.

Fig. 3 shows that the material treated with 1300°C - 3 hours heat treatment does not have good results whereas the material treated with 1450°C - 1 minute heat treatment shows good results with respect to the hydrogen storage properties.

This difference is due to the difficulty in formation of a BCC structure in the alloy. That is, the Mo percentage is relatively low (7%), a high heating treatment (1450°C or more) is

necessary to obtain a BCC structure in the entire alloy. Accordingly, a sufficient hydrogen storage property is not obtained in the material at a heat treatment 1300°C.

On the other hand, Applicants found that if the Mo percentage is appropriately high, the heating temperature does not seriously affect the hydrogen storage property. This is because the BCC structure becomes more stable in such a material constitution. As shown in Fig. 2, the alloy including 10 at % of Mo shows a good hydrogen storage property irrespective of the heating treatment.

Incidentally, Applicants note that Example 4 ($TiCr_{1.4}Mo_{0.4}$) includes about 14 % of Mo. This Example also has a sufficient hydrogen storage property irrespective of heat treatment.

As discussed above, the claimed material constitution is advantageous for obtaining a stable BCC structure without difficulty in heat treatment as compared to the material disclosed in JP 10-121180.

Thus, Applicants submit that the present invention is patentable over JP '180. Accordingly, withdrawal of this rejection is respectfully requested.

Obviousness Rejection

On page 4 of the Office Action, in paragraph 4, claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent JP 04-210446 A (JP '446) in view of Japanese Patent JP 10-121180 A (JP '180).

The Examiner's Position

The Examiner's position is basically that JP '446 teaches a hydrogen storage alloy composition have the general formula $Ti_xCr_{2-y}Mo_y$ (where $0.8 \leq x \leq 1.2$ and $0 < y \leq 1.0$) or the general formula $Ti_xCr_{2-y-z}Mo_yFe_z$ (where $0.8 \leq x \leq 1.2$, $y > 0$ and $z \leq 1.0$), which overlap the ranges instantly claimed. Further, the Examiner indicates that JP '446 teaches specific embodiments fully encompassed by the compositional ranges recited in claims 1-2, as shown in the JP '446 Figure:

試料 No.		合金組成	水素吸蔵量 (cc/g)	水素放出量 (cc/g)	効率 (%)	反応速度
発明材	1	$TiCr_{1.8}Mo_{0.2}$	330	240	73	○
	2	$TiCr_{1.8}Mo_{0.2}$	340	270	79	○
	3	$TiCr_{1.8}Mo_{0.2}$	330	240	73	○
	4	$TiCrMo_{0.8}Fe_{0.2}$	320	250	78	○
	5	$TiCr_{0.8}Mo_{0.8}Fe_{0.4}$	310	230	74	○
比較材	6	$TiCr_2$	190	140	74	○
	7	V	410	230	56	×

While JP '446 fails to explicitly teach the structure of the alloy or the heat treatment steps recited in the claims, JP '180 teaches a method wherein the hydrogen storage alloy is heat treated at conditions encompassed by the conditions instantly claimed, including a water quench (i.e.,

cooling at a rate not less than the speed of water cooling). JP '180 further teaches that the method of heat treatment and rapid cooling results in an equalization of the body centered cubic (BCC) structure, desirably provides a hydrogen storage alloy having increased hydrogen storage capacity, decreased manufacturing cost, and is an optimal manufacturing process capable of an industrial scale, so one of ordinary skill in the art would have been motivated to heat treat the alloy of JP '446 according the treatment taught in JP '180 in order to provide the JP '446 alloy with the desirable properties taught in JP '180.

Applicants' Response

Applicants respectfully submit that the present invention is not obvious over the cited art, and request that the Examiner reconsider and withdraw this rejection in view of the following remarks.

Initially, Applicants submit that that JP '446 does not make up for the deficiencies discussed above with respect to JP '180, so the present invention is not obvious from the combination of this references.

Further, as to the combination of JP 10-121180 and JP 04-210446, Applicants submit that JP 04-210446 is silent about crystal structure and heat treatment. Thus, Applicants submit that there is no motivation to combine the cited two references to reach the present invention.

Moreover, Applicants submit that the present invention is not obvious because it provides unexpectedly superior results, as discussed above.

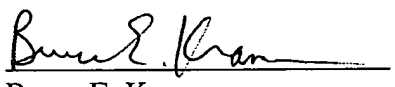
Therefore, Applicants submit that the present invention is not obvious over the cited art, and thus withdrawal of this rejection is respectfully requested.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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